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What is claimed is:

1.   A circuit for modulating an input signal x(t) to an output signal y(t), said circuit comprising:

a first mixer having an input for an RF signal, an input for a first mixing signal f1 and an output for a mixed signal based on said two input signals;

a second mixer having an input for an RF signal, an input for a second mixing signal f2 and an output for a mixed signal based on said two input signals, said output providing said output signal y(t), and said output of said first mixer being connected to said RF input of said second mixer;

a switch having one input and two outputs, said input for receiving said input signal x(t) and said two outputs being connected to separate ones of said RF signal inputs of said first mixer and said second mixer, whereby said switch can be selectively controlled to direct said input signal x(t) to the input of either said first mixer or said second mixer;

a first signal generator, for generating a multi-tonal mixing signal φ1 and providing said first mixing signal to said first mixer;

a second signal generator, for generating a mono-tonal mixing signal φ2 and providing said second mixing signal to said second mixer; and

a control circuit for controlling the position of said switch and the signals generated by said first signal generator and said second generator, said control circuit having two modes:

a first mode in which said switch is positioned to feed said input signal x(t) to said second mixer, and said second signal generator is operable to generate a direct-conversion type oscillator signal; and

a second mode in which said switch is positioned to feed said input signal x(t) to said first mixer, and said first and second signal generators are controlled to generate a virtual local oscillator signal pair where φ1 * φ2 has significant power at the frequency of a local oscillator signal being emulated, and neither of said φ1 nor said φ2 having significant power at the frequency of said input signal x(t) or said LO signal being emulated.

2.   The circuit of claim 1, further comprising a variable gain amplifier after said second mixer.

3.   The circuit of claim 1, further comprising a variable gain amplifier after said first mixer.

4.   The circuit of claim 1, further comprising an amplifier prior to said switch.

5.   The circuit of claim 1, further comprising an amplifier after said second mixer.

6.   The circuit of claim 1, wherein each of said amplifiers and each of said mixers is a differential device.

7.   A transmitter comprising:
two modulation channels like that of claim 1, a first channel for modulating an in-phase input signal, and a second channel for modulating a quadrature input signal; and
a summer to combine the outputs of said first channel and said second channel.

8.   The transmitter of claim 7, further comprising a variable gain amplifier after said summer.

9.   The transmitter of claim 7, further comprising an amplifier after said summer.

10.   The circuit of claim 7, wherein each of said amplifiers and each of said mixers is a differential device.

11.   A circuit for modulating an input signal x(t) to an output signal y(t), said circuit comprising:
a first mixer having an input for an RF signal, an input for a first mixing signal f1 and an output for a mixed signal based on said two input signals;
a second mixer having an input for an RF signal, an input for a second mixing signal f2 and an output for a mixed signal based on said two input signals, said output providing said output signal y(t), and said output of said first mixer being connected to said RF input of said second mixer;
a first signal generator, for generating either a multi-tonal mixing signal φ1 or a constant value signal, and providing said first mixing signal to said first mixer;
a second signal generator, for generating a mono-tonal mixing signal φ2 and

providing said second mixing signal to said second mixer; and

a control circuit for controlling the signals generated by said first signal generator and said second generator, said control circuit having two modes:

a first mode in which said first signal generator is controlled to generate a constant value signal, and said second signal generator is controlled to generate a direct-conversion type oscillator signal; and

a second mode in which said first and second signal generators are controlled to generate a virtual local oscillator signal pair where $\varphi 1$ * $\varphi 2$ has significant power at the frequency of a local oscillator signal being emulated, and neither of said $\varphi 1$ nor said $\varphi 2$ having significant power at the frequency of said input signal x(t) or said LO signal being emulated.

12.   The circuit of claim 11, further comprising:

a filter; and

a switch which is operable to selectively place said filter inline between said first and said second mixers;

said switch being controlled by said control circuit.

13.   The circuit of claim 11, further comprising a variable gain amplifier after said second mixer.

14.   The circuit of claim 11, further comprising a variable gain amplifier after said first mixer.

15.   The circuit of claim 11, further comprising an amplifier prior to said first mixer.

16.   The circuit of claim 11, further comprising an amplifier after said second mixer.

17.   The circuit of claim 11, wherein each of said amplifiers and each of said mixers is a differential device.

18.   A transmitter comprising:

two modulation channels like that of claim 11, a first channel for modulating an in-

phase input signal, and a second channel for modulating a quadrature input signal; and

a summer to combine the outputs of said first channel and said second channel.